True or False – (15 Points)

1. (15 pts) Circle T for true and F for false:

   T   F  a) In C++, a function definition should be nested within another function definition.

   T   F  b) Function names have global scope in C++.

   T   F  c) Value-returning functions must have the statement return expression;

   T   F  d) Arguments corresponding to value parameters can be literal values.

   T   F  e) value parameters receive a copy of an arguments value

   T   F  f) Arguments corresponding to reference parameters must be variables

   T   F  g) Members of a structure must have unique names

   T   F  h) Members of a structure must all be of the same DataTypes.

   T   F  i) The expression first.name could be used to access the member named first of the structure variable name.

   T   F  j) The default switch label is optional for a switch statement.

   T   F  k) A break statement is required in a switch statement

   T   F  l) All possible values for the switch expression must be included among the case labels for a given switch statement.

   T   F  m) The lifetime of a local variable is for the duration of the program

   T   F  n) When a break statement is executed, the loop in which it appears is exited.

   T   F  o) Local identifiers have name precedence over global identifiers.
Multiple choice (20 points) – Questions 2 – 11
For these problems circle all correct answers.
For example if answers A, C and E are all valid then circle A, C and E.

2. How many function values does a value-returning function have?
   A) 4          B) 2          C) As many as necessary
   D) 1          E) 3          F) None of these

3. A function that does not return a function value is known as what kind of function?
   A) Value returning function   B) Reference Parameter   C) Empty
   D) Void function             E) Expression less       F) None of these

4. Which operations below ARE ALLOWABLE aggregate operations on structures?
   A) Input/Output   B) Assignment   C) Return as a functions return value
   D) Arithmetic    E) Comparison   F) Pass by value in a function call

5. Which of the following can be used as a switch expression?
   A) floating point variable   B) char variable   C) string constant
   D) integer variable         E) bool variable   F) None of Them

6. Reference parameters (passing by reference) are used if a parameters data flow is
   A) One-way, into the function
   B) One-way, out of the function
   C) Two-way, into and out of the function
   D) None of these

7. Value parameters (passing by value) are used if a parameters data flow is:
   A) two-way, into and out of the function
   B) one-way, into the function
   C) one-way, out of the function
   D) None of these
8. What are the **value parameters** in the following **function heading**?

   ```
   void DoSomething(string date, int num, float& average, float sum, string& name)
   ```

   A) **date**  B) **num**  C) **average**  D) **sum**  E) **name**  F) **None of them**

9. What are the **reference parameters** in the following **function heading**?

   ```
   void DoSomething(string date, int num, float& average, float sum, string& name)
   ```

   A) **date**  B) **num**  C) **average**  D) **sum**  E) **name**  F) **None of them**

10. The **void** function named **GetNums** has two parameters

    A **pass-by-reference** parameter named **x** of type **float**
    A **pass-by-value** parameter named **num** of type **int**.

    Which of the following choices are valid **function prototypes** for the description of the parameters for the function **GetNums**?

    A) `void GetNums(float&, int);`
    B) `void GetNums(float& x, int num);`
    C) `void GetNums(float x, int num);`
    D) **none of the above**

11. The **void** function named **GetNums** has two parameters

    A **pass-by-reference** parameter named **x** of type **float**
    A **pass-by-value** parameter named **num** of type **int**.

    Which of the following choices is a valid **function heading** given the description of the parameters for the function **GetNums**?

    A) `void GetNums(float& x, int)`
    B) `void GetNums(float&, int num)`
    C) `void GetNums(float& x, int num)`
    D) **none of the above**
12. (4 pts) If the input stream contains the following numbers, 1 1 2 2 3 3 1 2 3, what is the output for the following segment of code?

```cpp
int number, sum = 0, count = 0;
do{
    cin >> number;
    sum = sum + number;
    cout << sum << "-" << number << endl;
    count = count + 2;
}while (count < 8);
```

13. (4 pts) Given the for loop below, write an equivalent do-while loop. Be sure to include all necessary variable declarations.

```cpp
for (int value=0; value <= 10; value++)
    cout << value << endl;
```
14. (4 pts) Given the following constant and variable definitions/declarations.

```c
const int SIZE = 10;
int sum;
float average;
string name;
void square(float); // void function prototype
```

consider the following list of expressions to be used as arguments in some function call:

a) SIZE*10   b) average   c) sum   d) name

e) square(average)  f) ‘A’   g) “name”   h) average*float(sum)

A) List all expressions above that are valid for use as arguments with reference parameters?

B) List all expressions above that are valid for use as arguments with value parameters?

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15. (4 pts) There are two functions shown in the code segment below. Assume all variables and function prototypes have been correctly declared before this segment of code.

```c
Average(sum, num);
status = WriteInfo(outFile, count);
```

A) Which function(s) is(are) most likely value-returning function(s)?

B) Which function(s) is(are) most likely void function(s)?

C) What are the arguments that are used in the function calls?
16. (3 pts) What is the output for the following segment of code

```cpp
int number = 2;
switch(number*2)
{
    default: cout << "default";
    case 0:  cout << 'A';
    case 3:  cout << 'B';
            break;
    case 6:  cout << 'C';
    case 9: cout << 'X';
    case 12: cout << 'Y';
}
```

17. (4 pts) Consider the following structure declaration when answering the questions below.

```cpp
struct Cars
{
    string maker;
    string model;
    int year;
    string color;
};
```

a) Write a statement that declares the identifier `car` as a variable of DataType `Cars`.

```cpp
\[\text{car} = \text{new Cars};\]
```

b) Write a `cout` statement that will output the value of the member `year` of the variable `car`.

```cpp
cout << \text{car}.year;
```

c) Write a `cout` statement that will output the value of the member `maker` of the variable `car`.

```cpp
cout << \text{car}.maker;
```

d) Write a statement that assigns a value of “Red” to the `color` member of `car`.

```cpp
\text{car}.color = \text{Red};
```

18. (4 pts) Write a structure declaration for a structure named `House` with the following members:
- an integer variable representing the year a house was built
- a string variable representing the type of house
- a floating-point variable indicating the cost of the house
19. (6 pts) Rewrite the **value returning function definition** below as a **void function definition** such that the caller of the function still has access to the result (contained in the function variable sum) that is being returned by the value returning function.

- Use three parameters (one reference and two value) with the void function.

```c
float FindSum(float avg, int num)
{
    float sum;
    sum = avg*float(num);
    return sum;
}
```

20. (8 pts) Write a segment of code **using a switch statement** to solve the following problem. The **char variable letter is used as the switch expression**, and it can contain ‘A’, ‘B’, ‘C’ or some other character. Only ‘A’, ‘B’ and ‘C’ are expected. If letter contains ‘A’, print out the word “Apple”. If letter contains ‘B’ print out the word “Bubble”. If letter contains ‘C’, print out the word “Color”. For any other value of letter, print out the word “Wrong”.

```c
```
21. (8 pts) For the following code segment, write out what is printed to the screen. Show the displayed output precisely by using the following rules:
   - Write one character per box.
   - Skip a box to indicate the presence of a blank space in the output.
   - Skip a row to indicate the presence of a blank line in the output.

```cpp
#include <iostream>
using namespace std;
void Test();
int main()
{
    Test();
    Test();

    Test();
    Test();
    return 0;
}
void Test()
{
    static int i = 0;
    static int j = 5;

    j--;
    cout << i << "—" << j << endl;
    i= i + 2;
}

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``
22. (6 pts) For the questions A through G, consider the following program. Note just the lines of importance have been displayed here. There is at least one answer for each question, and some may have more than one answer. Provide ALL the answers to a question. As an example, if the question is “what line contains a return statement?” The answer is line 12, 14, 16 and line 18.

```cpp
#include <iostream>         // Line 1
using namespace std;         // Line 2
int function_1(int&, float, int);       // Line 3
void function_2(float&, int, float&);      // Line 4
void function_3();          // Line 5
int main()           // Line 6
{
    int sum1, num, enter;        // Line 7
    float temp, avg;         // Line 8
    function_3();          // Line 9
    function_2(avg,num,temp);       // Line 10
    function_2(avg,function_1(sum1,avg,num),temp);   // Line 11
    return 0;          // Line 12
}
int function_1(int& sum, float number, int enter)   // Line 13
{
    return enter;          // Line 14
}
void function_2(float& average, int count, float& number)  // Line 15
{
    return;           // Line 16
}
void function_3()              // Line 17
{
    return;           // Line 18
}
```

A) Which of the lines indicated are function prototypes? ______________________________

B) Which of the lines indicated include function calls? ________________________________

C) Which lines are the start of a function definition? __________________________________

D) What are the arguments used in the function call for function_1? _____________________________________________________________________

F) Which parameter(s) of function_1 are value parameters? _____________________________________________________________________

G) Which parameter(s) of function_2 are reference parameters? ___________________________________________________________________
23. (10 pts) Finish the program below by adding a void function as specified below. **Add only a function prototype, function call statement and function definition** to the following program.

The name of the **void** function is **InitStruct**.
The function has **one parameter** of the struct **DataType Name**.
The function is to initialize each member of the structure parameter with a value of “**NoName**”. The information stored in the parameter **must be available in main()** after the function call.

```cpp
#include <iostream>
using namespace std;

struct Name
{
    string first;
    string middle;
    string last;
};
// Place the function prototype below this line

int main()
{
    Name person;
    // Place the function call statement below this line

    return 0;
}
// Place the function definition below this line
```
Extra Credit (5 pts)
For this problem show precisely the displayed output
- Write one character per box.
- Skip a box to indicate the presence of a blank space in the output.
- Skip a row to indicate the presence of a blank line in the output.

The following program is executed. What is the output to the screen?

```cpp
int count = 11;
bool finished = false;
while (!finished)
{
    cout << count << endl;    // executes with each loop iteration
    count--;                   
    if (count >= 0)           
        finished = false;     
    else                       
        finished = true;      
    count--;                   
}
// output when loop exits
cout << "count is:" << count << endl;
```